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DeMarco

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[54] **FOLDING UMBRELLA**

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[51] **Int. Cl.²** **A45B 19/10**

[58] **Field of Search** ..... 135/25 R, 25 A, 27

[56] **References Cited**

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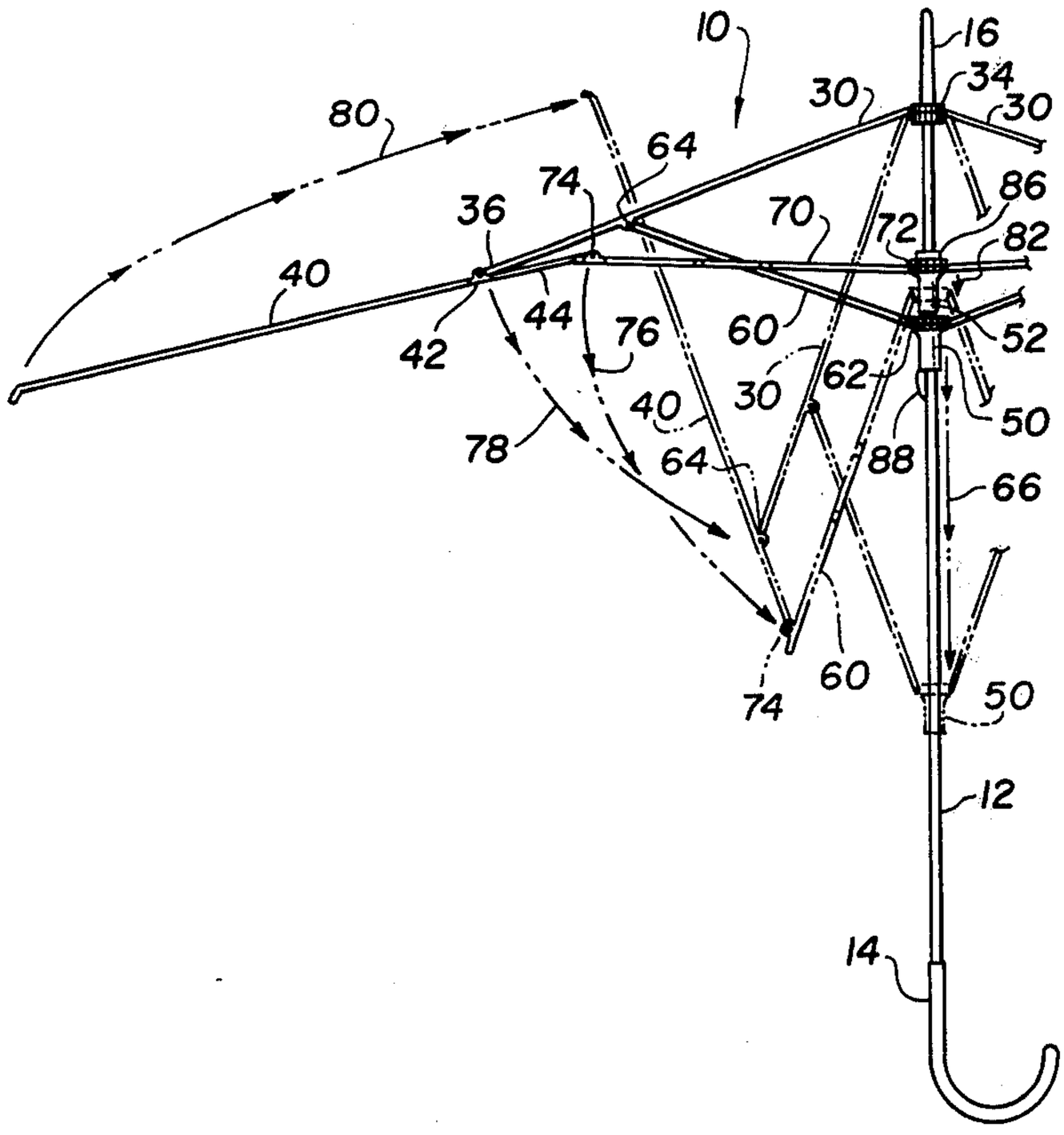
[57] **ABSTRACT**

A folding umbrella of the type in which a lower section closes upon an upper section, as both these sections close upon the umbrella rod, and wherein this closing movement is automatically achieved, i.e. is the result of articulating or pivotal movement of the umbrella ribs, rather than being movement that must be manually imparted.

2 Claims, 7 Drawing Figures



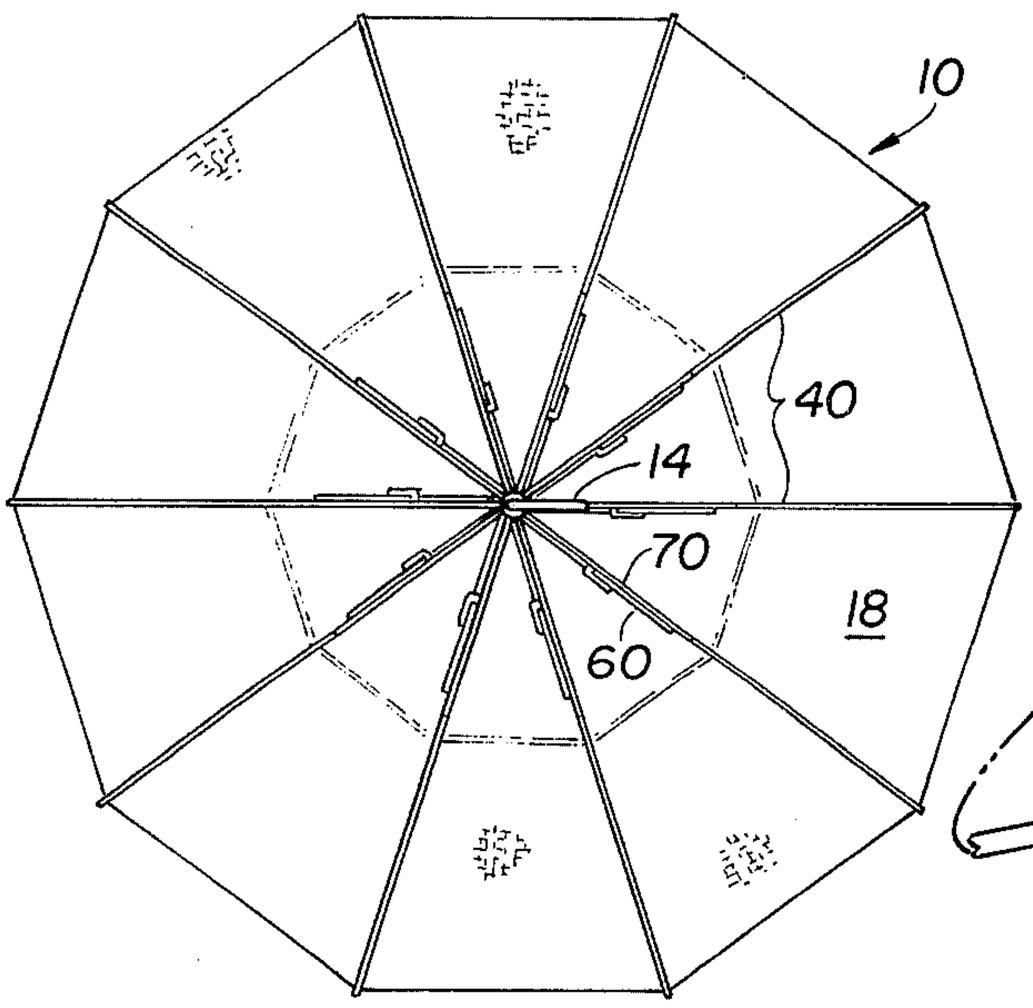


FIG. 2

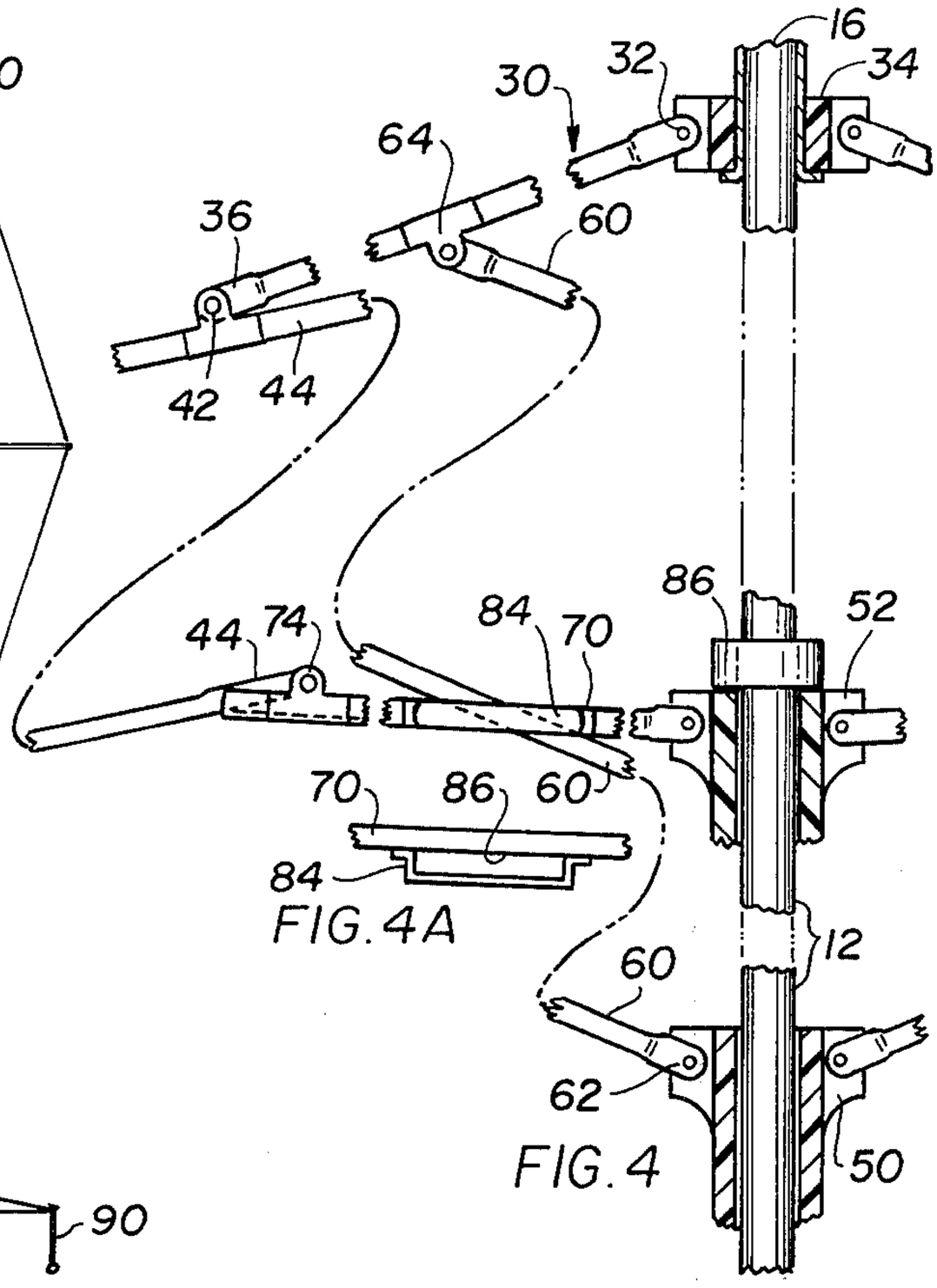


FIG. 4A

FIG. 4

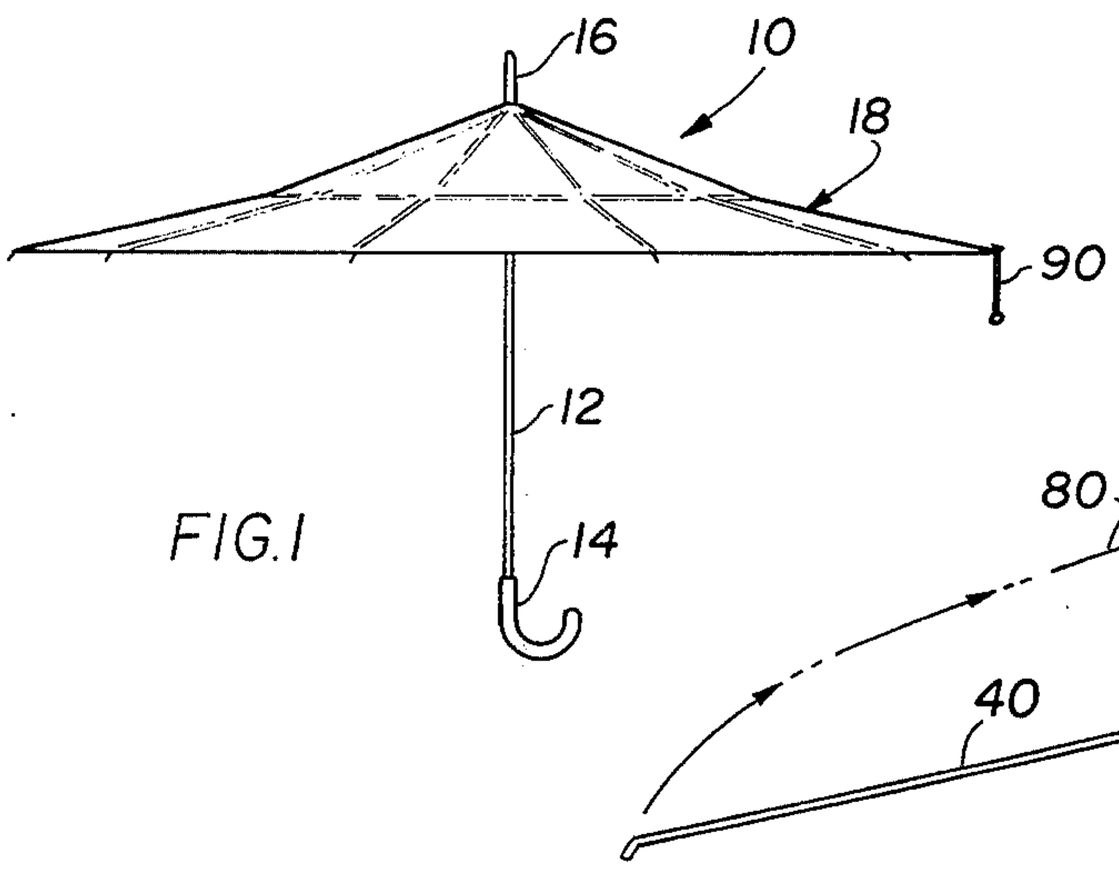
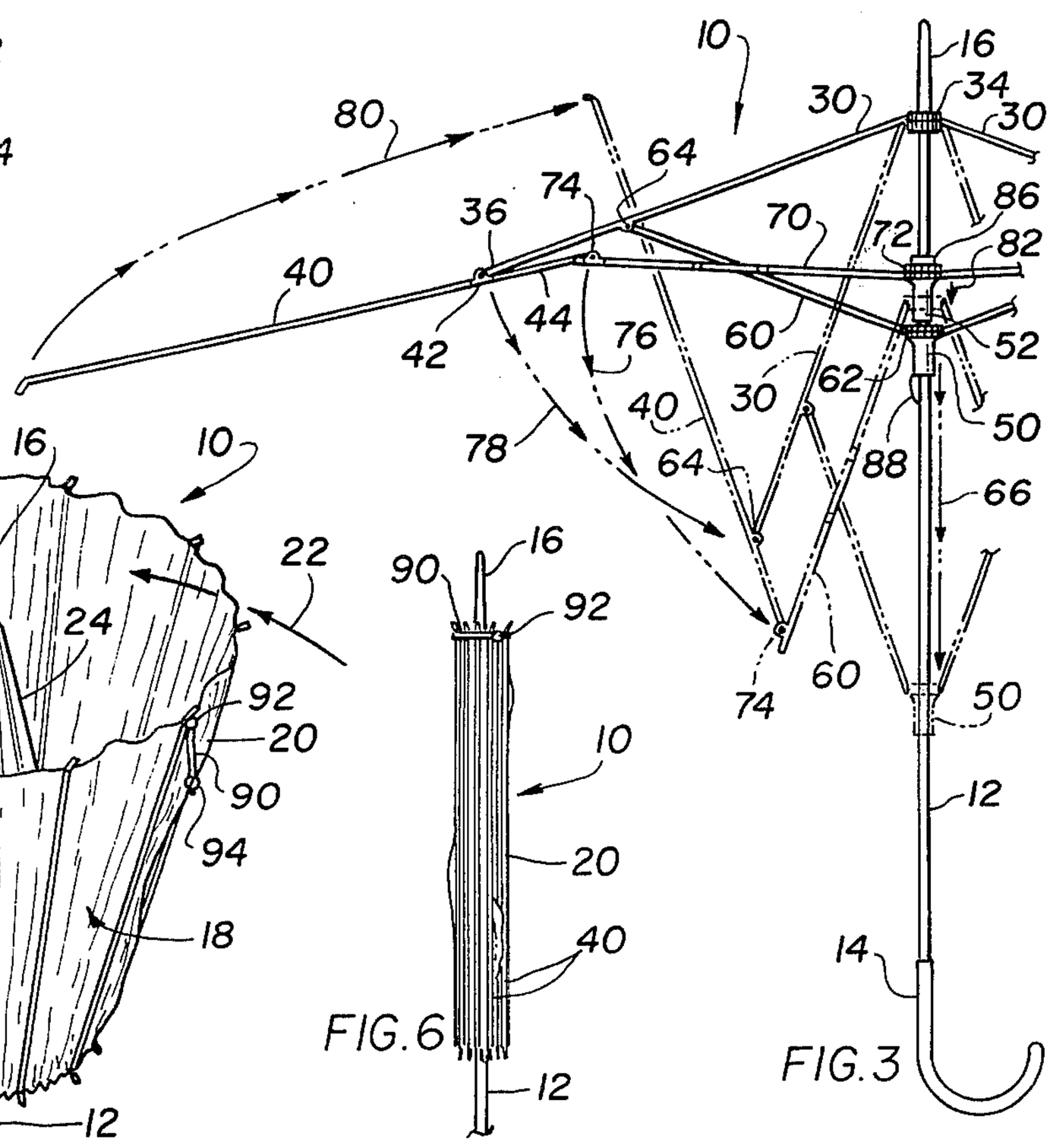


FIG. 1



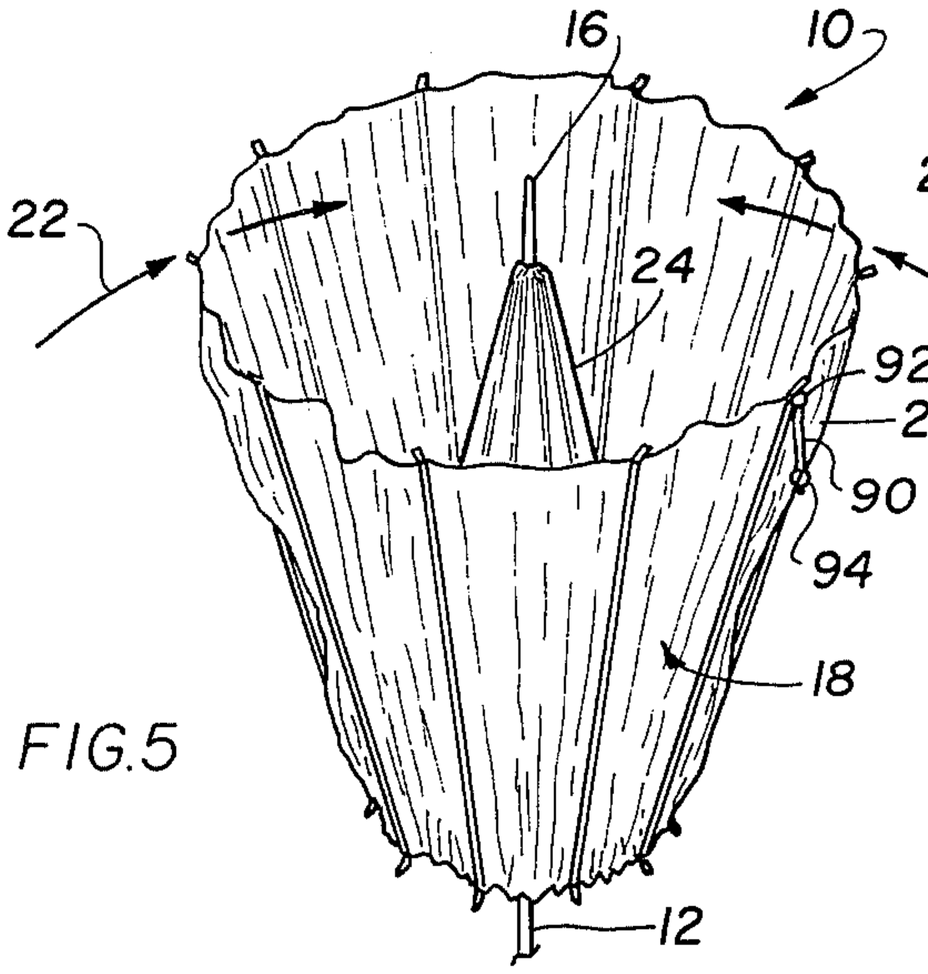


FIG. 5

FIG. 6

FIG. 3

FOLDING UMBRELLA

The present invention relates generally to umbrellas, and more particularly to an improved folding umbrella, in the closing of which, the collapse of all of the ribs is achieved automatically, rather than manually, either entirely or even in part.

As generally understood, it is already well known, as exemplified by the umbrella of U.S. Pat. No. 1,964,292, among others, that an advantageous compact umbrella storage condition can be achieved by allowing for pivotal movement of a lower umbrella section upon an upper section, as these sections are closed upon the umbrella rod. In addition to the noted compact storage condition, this also projects the normally dry undersurface of the lower umbrella section to the outside, and thus does not wet or otherwise soil clothing or the like contacting the umbrella. These known folding umbrellas are in common use, even though the folding movement of the lower section, after collapse of the rib structure, must be achieved manually. This manual folding operation, moreover, is often inconvenient to perform because the lower section of ribs, which extend circumferentially from about the umbrella, must be gripped, usually one at a time and folded, and then held as each other rib is successively gripped and folded.

Broadly, it is an object of the present invention to provide an improved folding umbrella overcoming the foregoing and other shortcomings of the prior art. Specifically, it is an object to cause complete "automatic" collapse of the umbrella rib structure, and yet maintain a desirable degree of structural rigidity in the ribs in their open condition; thus, the collapse referred to is not at the expense of lessening the support afforded by said ribs.

An improved folding umbrella demonstrating objects and advantages of the present invention includes a central umbrella rod having at opposite ends a handle and an operative distal end and defining a path of movement therealong between said handle and distal end, and rib structure comprised of a first set of plural circumferentially spaced umbrella cover-supporting ribs each operatively pivotally mounted at one end adjacent said distal end of said rod and presenting opposite operative ends, and a second set of plural umbrella cover-supporting ribs cooperating with said first set which are each at locations spaced from one end to provide a fulcrum pivotally attached to a cooperating operative end of one said rib of said first set. Also disposed on the rod are upper and lower slide members which respectively support one end of two sets of rib movement-actuating braces. Specifically, there is a first set of plural braces pivotally connected between a cooperating rib of said first set of ribs and said lower slide member so as to partake of pivotal umbrella opening and closing movements in response to ascending and descending sliding movements respectively of said lower slide member, and a second set of plural braces each pivotally connected between said fulcrum end of a cooperating rib of said second set of ribs and said upper slide member so that during initial descending sliding movement of said lower sliding member preparatory to umbrella closing movement of said first and second sets of ribs there is caused a corresponding initial sliding movement in said upper sliding member effective to initiate clockwise pivotal movement in said

fulcrum ends of said second set of ribs. The consequence of the foregoing is that in response to continued descending sliding movement of said lower sliding member, said first and second sets of ribs close upon each other as well as upon said umbrella rod.

The above brief description, as well as further objects, features and advantages of the present invention, will be more fully appreciated by reference to the following detailed description of a presently preferred, but nonetheless illustrative embodiment in accordance with the present invention, when taken in conjunction with the accompanying drawings, wherein:

FIG. **1** is a side elevational view of the within improved umbrella in its open condition;

FIG. **2** is a bottom view of said umbrella;

FIG. **3** is a partial side elevational view, on an enlarged scale, with the weather barrier cover removed to better illustrate the cover-supporting ribs, and wherein the positions of pivotal movement of said ribs in their open and closed positions are illustrated in full line and phantom line perspective;

FIG. **4** is a partial side elevational view illustrating how the ribs and braces of the umbrella are cooperatively assembled with each other;

FIG. **4A** is a detailed bottom view illustrating a slot formed on one of the umbrella braces;

FIG. **5** illustrates how the umbrella folds into its closed condition, wherein two halves or sections of the umbrella close upon each other while both said sections close upon the umbrella rod; and

FIG. **6** illustrates the within umbrella in its completely folded or closed condition.

FIGS. **1, 2,** demonstrate that the within umbrella, generally designated **10,** is conventional to the extent of including the usual umbrella rod **12** having at one end a handle **14** and at its upper distal end **16** a plurality of circumferentially spaced ribs, to be described in greater detail subsequently, which support a weather barrier or cover **18** of suitable material, such as fabric, plastic, or the like. The within umbrella **10** is the type which has a compact folded storage condition, as illustrated in FIG. **6.** More particularly, as illustrated in FIG. **5,** the lower portion or section of the cover **18,** more particularly designated **20,** folds up in the direction **22** against an upper section **24,** as both sections **20, 24** fold against the rod **12.** As a consequence, the cover **18** naturally takes only half as much space as it would otherwise, and also the dry "inside" surface of the lower section **20** is placed in an outwardly facing relation, rather than the opposite "weather" side of the cover **18** which is apt to be wet following a typical use.

Although the umbrellas having the performance just described are already well known, as exemplified by the umbrella of U.S. Pat. No. 1,964,292, in these known umbrellas it is necessary that the lower section **20** be folded manually against the upper section **24** in order to achieve the umbrella compact storage condition of FIG. **6.** As a significant advance over these known umbrellas, the within umbrella **10,** by virtue of its structural features and the cooperative relation of these structural features, is effective during the closing of the umbrella to have the lower section **20** close upon the upper section **24** automatically, and further to have the sections **20, 24** automatically close upon the umbrella rod **12** to provide said desirable compact storage condition of FIG. **6.** By "automatic" is meant that in the closing of the umbrella, the articulation or folding movement **22** of the lower umbrella section **20** upon

the upper section **24** necessarily results because of mechanical linkage embodied in the umbrella **10,** as will now be described in detail.

This mechanical linkage, as best shown in FIG. **3,** includes a first set of plural circumferentially spaced umbrella cover-supporting ribs, individually and collectively designated **30.** Each rib **30** of this first set is pivotally connected, as at **32,** adjacent the umbrella distal end **16** to a fixed hinge **34** mounted at the location illustrated on the umbrella distal end **16.** In the open condition of the umbrella, as illustrated in full line in FIG. **3,** each rib **30** extends from the pivot **32** in a slightly downwardly inclined angular orientation and presents opposite operative ends **36** in circumferentially spaced relation about the axis of the rod **12.**

A second major component of the umbrella **10** hereof includes a second set of umbrella cover-supporting ribs, individually and collectively designated **40.** Each rib **40** is pivotally connected to a cooperating one of the ribs **30,** and more particularly to an operative end **36** of said rib **30,** and the point of interconnection is selected to be at a point spaced inwardly of an end, as at **42,** so as to provide a fulcrum length **44** for each rib **40,** the significance of which fulcrum length **44** will soon be apparent.

Slidably disposed for movement along the path defined by the cylindrical body of the rod **12** are two slide members **50** and **52** which are arranged in the superposed relation illustrated.

Cooperating with the lower slide member **50** is a first set of circumferentially spaced braces, individually and collectively designated **60.** Each brace **60,** as illustrated in FIG. **3,** is connected in spanning relation between the lower slide **50,** as at **62,** and point **64** of a cooperating one of the ribs **30.** The connections made at the locations **62** and **64** are pivotal, so that in response to descending movement **66** of the lower slide member **50** the ribs **30** close against the rod **12,** all as is illustrated in full line and phantom line perspective in FIG. **3.** Likewise, in response to opposite or ascending movement of the lower slide **50,** the ribs **30** are urged through umbrella opening movement and assume the position of movement illustrated in full line in FIG. **3.**

Completing the construction of the mechanical linkage of the umbrella **10** is a second set of circumferentially spaced braces, individually and collectively designated **70.** Each brace **70** is pivotally connected at its opposite ends, as at **72** and **74,** respectively, to the upper slide member **52** and to the end of the fulcrum length **44** of each rib **40.** It is one of the important contributions of the within invention to recognize that the support brace **70** of each rib **40** requires pivotal connection to a movable member, such as slide **52,** rather than to a stationary hinge. The reason is that in the open condition of the umbrella, in which rib **40** serves as an extension for a cooperating rib **30,** rigidity of construction requires that the innermost end **74** of each rib **40** assume a slightly elevated condition in relation to the operative end **36** of the rib **30.** Also, to obviate any tendency in the rib **40** to inadvertently rotate clockwise about the pivot connection **42** in the open condition of the umbrella, the holding brace **70** must be held in the horizontally oriented condition illustrated to prevent inadvertent movement of said end **76.** However, when it is desired to place the umbrella **10** in its compact folded condition, an unlocking or unhinging movement is required in the brace **70** which could not be obtained if the end **72** of each brace **70** was made to a stationary hinge member. It is therefore significant that since it is slide member **52** which supports the end **72** of each brace **70,** that said slide member **52** can descend slightly, as illustrated in phantom perspective in FIG. **3,** when the main or lower slide member **50** is urged through movement **66** preparatory to closing the umbrella **10.** As a consequence, not only does the end **72** of brace **70** descend, but also the end **74.** The descent of the end **74** is, of course, effective in urging the rib **40,** and more particularly the fulcrum length **44** thereof, through an initial clockwise pivotal movement in relation to the pivot **42.** This movement is designated **76** in FIG. **3.** Simultaneously with movement **76,** the rib ends **36** of ribs **30** are urged through closing movement **78.** From the foregoing, it should be readily apparent that in response to descending movement of slide member **50,** and just as important, in response to an initial descending movement in slide member **52,** that the upper section of ribs **30** are urged through pivotal movement about the pivots **32** and close upon the rod **12** and that the lower section of ribs **40** are urged through clockwise pivotal movement about pivots **42** and thus partake of closing movement in relation both to the umbrella rod **12** and the upper section of ribs **30.**

As is perhaps best illustrated in FIG. **3,** after an initial descending movement in the slide member **52,** denoted by the reference numeral **82** and by the full line and phantom line perspective of said member **52,** there is no further descending movement of the slide member **52** along the rod **12,** since the sliding movement **82** is sufficient to lower the rib end **74** of the ribs **40** below the pivot **36,** thereby enabling the ribs **40** to be urged through closing movement **80** in a clockwise rotation relative to the pivots **42.**

In FIGS. **4, 4A,** the linkage just described in conjunction with FIG. **3** is illustrated on an enlarged scale. These figures also illustrate the crossing relation of the braces **60** and **70.** In accordance with the present invention, and as is perhaps best shown in FIG. **4A,** at the intersection of said braces an interfitting or interconnecting structure is provided which contributes to the rigidity of the cover-supporting ribs **30, 40.** Specifically, in the preferred embodiment as illustrated, each brace **70** has a slot-forming member **84** appropriately connected to it, as by welding or the like. The operative position of each brace **60** is one in which it is projected through the generally rectangular slot **86** formed by the member **84,** and thus each cooperating pair of braces **60** and **70** is confined in its movement to prescribed movement paths during opening and closing movement of the umbrella **10.**

Completing the umbrella **10** is a stop **86,** appropriately stationarily mounted on the rod **12** which limits the ascending movement of the upper slide member **52.** A conventional spring-operated catch **88** embodied in the rod **12** is strategically located to hold the lower slide **50** in its uppermost position of movement when umbrella **10** is open. Catch **88** is, of course, depressed within the rod **12** preparatory to closing of the umbrella **10.** The distance between the catch **88** and the stop **86** is of a sufficient selected extent to allow the slide members **50** and **52** to occupy superposed positions, as illustrated in FIG. **3,** when the umbrella **20** is open. Also, if slide member **50** is moved through descending movement **66** during the closing of the umbrella **10,** it will be understood that the length portion which it vacates between the catch **88** and the lower portion of

the slide **52** is sufficient to allow the previously noted initial descending movement **82** in the slide member **52** which, in the manner already described, results in the initial clockwise movement in the lower section of ribs **40** during closing movement **80** thereof.

From the foregoing description, it should be readily appreciated that umbrella **10** hereof readily assumes the compact storage condition illustrated in FIG. **6** automatically in response to descending movement **66** of the slide member **50.** For appearance sake, an elastic band **90** having a button **92** at its attached end, and a ring **94** at its free end is secured in a looped relation about the upper portion of the ribs **40** to assist in holding it in its closed condition. As already noted, not only is the closed condition of the umbrella compact for storage, but the normally dry undersurface of the umbrella section **20** is projected to the outermost position, and thus does not wet or otherwise soil clothing or the like brought in contact therewith. These and other advantages, as already indicated, are the result of the closing, in automatic fashion, of the ribs **30** and **40** upon themselves and also upon the umbrella rod **12.**

A latitude of modification, change and substitution is intended in the foregoing disclosure and in some instances some features of the invention will be employed without a corresponding use of other features. Accordingly, it is appropriate that the appended claims be construed broadly and in a manner consistent with the spirit and scope of the invention herein.

What is claimed is:

1. An improved folding umbrella comprising a rod having at opposite ends a handle and an operative distal end and defining a path of movement therealong between said handle and distal end, a folding and unfolding cover for said umbrella, a first set of plural circumferentially spaced umbrella cover-supporting ribs each operatively pivotally mounted at one end adjacent said distal end of said rod and presenting opposite operative ends, a second set of similarly circumferentially spaced plural umbrella cover-supporting ribs cooperating with said first set by serving as a radial extension thereof which are each at locations spaced from one end to provide a fulcrum pivotally attached to a cooperating operative end of one said rib of said first set, upper and lower slide members disposed on said rod for sliding movement therealong, a first set of plural braces pivotally connected in spanning relation in the plane of said first and second sets of ribs between a cooperating rib of said first set of ribs and said lower slide member so as to partake of pivotal umbrella opening and closing movements in response to ascending and descending sliding movements respectively of said lower slide member, a second set of plural braces each pivotally connected substantially in said same plane as said first set of braces in spanning relation between said fulcrum end of a cooperating rib of said second set of ribs and said upper slide member so that during initial descending sliding movement of said lower sliding member preparatory to umbrella closing movement of said first and second sets of ribs there is caused a corresponding initial sliding movement in said upper sliding member effective to initiate clockwise pivotal movement in said fulcrum ends of said second set of ribs, each brace from said first set naving a criss-crossing relation with a brace from said second set in said open condition of said umbrella, and at each said location where said cooperating braces criss-cross one said brace has a slot formed therein and said other brace has an operative position projected through said slot, whereby in response to continued descending sliding movement of said lower sliding member said first and second sets of ribs close upon each other as well as upon said umbrella rod.

2. An improved folding umbrella as claimed in claim **1** including a stop and a catch means in spaced apart relation on said umbrella rod, said stop limiting ascending movement of said upper slide member and said catch means selectively holding said lower slide member in its ascended position of sliding movement, said spacing between said stop and catch means being sized to accommodate said first and second slide members therebetween.

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